Service Information No. 0005 com

Date:May 27, 2014Subject:Fuel change over or MDO at HFO applications for longer operating periods

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Change of fuel from HFO to distillate fuels for extended periods of time

In 2015 the SECAs / ECAs areas related to MARPOL Annex VI come into effect and action must be taken to meet the new emission limits. For operators who will change from HFO operation over to (low sulfur) distillate fuels for extended periods of time we would like to give some information and recommendations to support continuous safe and reliable operation of their MaK engine.

All fuel oils stated in our engine operation manual (ISO8217) can be used for MaK engine operation. Please note that MDX fuels cannot be used for marine applications due to the low flash point.

Engine operation with low sulphur fuels (<0.1 % S) is allowed. Please assure that the fuel oil viscosity does not drop below 1.5 cSt. Please ask for an HFFR lubricity test from the fuel oil supplier.

When operating an HFO designed engine plant on distillate fuels for an extended period of time (>750 h) we recommend using a lubricating oil with lower alkalinity (TBN 12-15).

Due to fuel incompatibility, accumulation of coagulated asphalts is possible and shorter filter cleaning intervals might occur. Please pay attention on bunker tanks also.

Low load engine operation on MDO / MGO might increase the temperature of the circulating fuel oil. Please assure that the fuel oil temperature before the engine does not exceed 50°C at all engine loads! When applicable a fuel oil cooler must be installed.

There is NO need to exchange injection nozzle elements

A modification of the injection pumps is NOT needed.

When operating HFO engines on distillate fuels for extended periods of time, the inlet valves might show increased wear. Please refer to our MDO job card for valve projection measurement (please find attached). When noticing wear in the vicinity of the wear limits (stated in the related job card), or when high inlet valve wear is noticed during standard overhauls, we recommend installing inlet valves and inlet valve seat rings designed for MDO operation (only available for M32 and M43). Please contact your MaK service distributor for technical details (e.g. no grinding / rework at the MDO inlet valve stems allowed) and ask for new job cards. Please note that M20 and M25 engines have the same inlet valve design for MGO / MDO / HFO operation.

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The change over from HFO to MDO might cause fuel leakages at low pressure fuel pipe interfaces. The exchange of hardened gaskets and O-rings in these areas is recommended.

Depending on the ratio of HFO to MDO operation, the interval for turbocharger washing and piston maintenance might be altered and prolonged. The parts condition found during standard maintenance works will indicate whether a prolongation is possible.

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M20/M25/M32/M43/M46DF/GCM34

See also:	
Spare parts list:	
Personnel requirement:	1 Pers.
Personnel qualification:	skilled engine hand
Operating medium:	Gas and distillate fuel

Activities:

1. Check valve projection on inlet and exhaust valves

Engine type	Tools	Pos.	Tool No.	
M 20 C	Barring rod	W1	2.9100-380	*
M 20 C, M 25 C, M 32 C, VM 32 C, M 43 C, VM 43 C	Socket wrench (for indicator valve, decompression valve)	W2	1.9100-060	
M 20 C, M 25 C	Depth gauge	W3	251042 A	
GCM34 M 32 C, VM 32 C, M 43 C, VM 43 C, M 46 DF, VM 46 DF	Depth gauge	W3	341033 A	
* no picture				

	NOTE
1	So-called valve projection is used to identify premature wear of the valves and valve seat inserts. It is measured at regular intervals at a defined location, and the measured values are documented and evaluated.
	The valve height is to be measured upon commissioning, after installation of new or overhauled cylinder heads, and at further defined measuring intervals by means of a depth gauge (Fig. 1 /W3). The obtained measuring values are to be recorded on the attached measuring sheet and then copied into the " Valve Projection FalsePlease forward the filled in evaluation chart to your responsible Caterpillar Customer Service for an evaluation of the measuring values.



M20/M25/M32/M43/M46DF/GCM34

1. Check of valve projection on inlet and exhaust valves

1.1 Secure the engine to prevent unintentional starting.

Conventional diesel engine:

- Interrupt the starting air supply.
- Throw and secure the emergency stop lever.
- Set the selector switch on the control stand to "Repair" (depending on equipment).

Common rail diesel engine and dual fuel engine:

- Interrupt the starting air supply.
- Set the selector switch on the control stand to "Repair" (depending on equipment).

Gas engine:

- Interrupt the starting air supply.
- Set the key switch at the "Local Data Board" to "OFF".
- Remove the key.
- 1.2 Engage the barring device and secure it against unintentional operation (not provided for the M 20 C).
- 1.3 Insert the barring rod (W1) into the hole in the flywheel (for M 20 C).
- 1.4 Disassemble valve cover.
- 1.5 Open the indicator valves/decompression valves with the socket wrench (W2) (not provided for the GCM34).
- 1.6 Bar the piston of the cylinder unit to be checked to firing TDC.
 - The rollers of the inlet and exhaust cam followers are on the base circle of the camshaft.
 - The rocker arms are relieved.
 - There is perceptible clearance at the push-rods.



CAUTION

Thoroughly clean the contact surfaces before measuring and check them for damage.

 Put on depth gauge (W3) as shown in Fig. 1 so as to cover a large surface and without tilting it and enter the measured value in the attached table.





Maintenance / Inspection

M20/M25/M32/M43/M46DF/GCM34

1.8 The corresponding valves and valve seat inserts are to be replaced if valve projection exceeds the values indicated in the table below since commissioning or the last replacement (valve stem/ valve seat).

Engine type	Limit value "GFalse
M 20 C	≥ 2.0 to 3.0 mm
M 25 C	<u>></u> 2.5 to 3.5 mm
M 32 C, VM 32 C	≥ 3.0 to 4.0 mm
GCM34	≥ 3.0 to 3.5 mm
M 43 C, VM 43 C	≥ 3.5 to 4.5 mm
M 46 DF, VM 46 DF	≥ 3.5 to 4.5 mm





Maintenance / Inspection

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- 1.9 Close the indicator valves/decompression valves with the socket wrench (W2) (not provided for the GCM34).
- 1.10 Check and, if necessary, replace the gaskets of the valve covers.
- 1.11 Install valve cover.
- 1.12 Disengage the barring device (not provided for the M 20 C).



A DANGER

Danger when starting the M 20 C engine with barring rod still inserted. For barring the M 20 C engine a barring rod is used.

The inserted barring rod is not monitored by the control system and, therefore, does not cause a starting interlock. If all other starting conditions are met, this engine could be started with an inserted barring rod!

There is danger to life due to the barring rod striking around or being hurled out.

Remove the barring rod from the hole in the flywheel before starting the engine.

- 1.13 Remove barring rod (W1) from the hole in the flywheel (for M 20 C).
- 1.14 Lift the measures for securing the engine to prevent unintentional starting.

Conventional diesel engine:

- Reestablish starting air supply.
- Set the emergency stop lever to operating position.
- Set the selector switch on the control stand to "Engine" or "Remote".

Common rail diesel engine and dual fuel engine:

- Reestablish starting air supply.
- Set the selector switch on the control stand to "Engine" or "Remote".

Gas engine:

- Reestablish starting air supply.
- Insert the key into the key switch at the the "Local Data Board".



M20/M25/M32/M43/M46DF/GCM34

